Individual Augmentee Deployment And Newly Reported Mental Health Morbidity

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14. ABSTRACT
Current deployments to Iraq and Afghanistan have generated concern regarding the association between combat deployment and mental health disorders. Those deploying on an individual assignment (IA) may be at increased risk for mental health challenges. The objective of this research is to describe new-onset of self-reported posttraumatic stress disorder (PTSD), depression, anxiety, and alcohol disorders in the Millennium Cohort and assess the relationship between IA deployment and mental health morbidity. Millennium Cohort Study members deployed for the first time in support of the wars in Iraq and Afghanistan between baseline and follow-up were included in these analyses (n = 12 952). Women deployed on an IA with reported combat exposures were at greatest risk of any mental health outcome (odds ratio [OR] 4.04; 95% confidence interval [CI], 1.90-8.62), PTSD (OR 8.24; 95% CI, 2.88-23.61), or alcohol abuse (OR 3.20; 95% CI 1.11-9.25) postdeployment compared with regular deployed women without combat exposures. This investigation contributes insight into which additional services those deployed on an IA may benefit from to prevent mental health challenges. Military women deployed on IA, in particular, may benefit from additional time and efforts to increase social support and unit cohesion before deployment.

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Individual Augmentee Deployment and Newly Reported Mental Health Morbidity

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Objective: To investigate the association between US Navy individual augmentee (IA) deployers, who may lack the protective effects of unit cohesion and social support, and newly reported mental health. **Methods:** Responses from the Millennium Cohort Study questionnaires were examined for 2086 Navy deployers in this prospective exploratory study. Multivariable logistic regression was used to evaluate IA deployment and newly reported mental health symptoms. **Results:** After adjusting for covariates, IA deployment was not significantly associated with newly reported posttraumatic stress disorder (odds ratio = 1.02; 95% confidence interval: 0.53–1.95) or mental health symptoms (odds ratio = 1.03; 95% confidence interval: 0.66–1.60) compared with non-IA deployment. **Conclusion:** IA deployment was not associated with increased risk for posttraumatic stress disorder or mental health symptoms following deployment. It is likely that social isolation was not highly influential among Navy IAs in this study.

Service members deployed as individual augmentees (IAs) under a unit different from their current assignment, may lack the protective effects of unit cohesion and social support, and therefore be at increased risk for mental health disorders. Although published studies have found low unit cohesion and social support to be associated with posttraumatic stress disorder (PTSD), depression, anxiety, and alcohol misuse,[1–3] research on IA deployment and mental health are lacking. US Navy IAs who deploy in support of the operations in Iraq and Afghanistan are postulated to be at increased risk for PTSD and other mental health symptoms.

Comrades in arms often serve as a network of support, functioning as an extended family while deployed. Stress from combat may increase among those who do not share unit cohesion developed over several months or years of group training. Concern for the disintegration of unit cohesion from individual replacement of troops dates to World War I where recruits were parsed to various units.[4] This led to a change in procedure in the early 1980s toward unit replacement, which was found to increase unit cohesion when compared with individual replacement.[4,5] However, with the current operations in Iraq and Afghanistan surpassing others as the longest conflict in US history, the need to individually augment ground-sustaining forces has increased, with escalating numbers of US sailors deploying as IAs.

The Millennium Cohort Study is the largest, ongoing population-based US military cohort designed to longitudinally evaluate the long-term health effects of service, and affords the unique opportunity to explore mental health symptoms in this potentially vulnerable IA population.[6] This is the first prospective exploratory study to investigate the relations of IA deployment and newly reported mental health symptoms among US Navy deployers.

METHODS

Study Population

Participants included in this study were drawn from the Millennium Cohort Study, initiated in 2001 with the primary goal of prospectively examining the role that military occupation and its inherent exposures have on the long-term health of service members. This study consists of Navy deployers who completed questionnaires during the 2004–2006 and 2007–2008 assessments. Included were invited participants from the first and second panels that were randomly selected from US military personnel rosters as of October 2000 and October 2003, respectively. To ensure adequate statistical power, the first panel oversampled for Reserve and National Guard members, women, and deployers to southwest Asia, Bosnia, or Kosovo between 1998 and 2000, whereas the second panel oversampled for military personnel with 1 to 2 years of service, Marines, and women. A more detailed methodology of the Millennium Cohort Study has been published.[6]

This study was approved by the Institutional Review Board of the Naval Health Research Center and the research was conducted in agreement with all applicable federal regulations governing the protection of human subjects in research (protocol NHRC.2000.0007). Consenting members were assured that their participation is voluntary and that their responses are confidential. A power calculation was conducted a priori on the basis of previous work[7] to assess if the projected sample size could reasonably detect an effect. Of the 10,649 Navy Millennium Cohort Study participants, those who did not deploy in support of the current operations in Iraq and Afghanistan between the questionnaire assessments ($n = 8369$), did not complete questions used to screen for mental health symptoms ($n = 65$, all of which were for PTSD symptoms), were missing covariate data ($n = 64$), and reported PTSD symptoms at the 2004–2006 assessment were excluded ($n = 65$), leaving 2086 participants for the analysis of newly reported PTSD symptoms. In addition, those who reported any mental health symptoms at the 2004–2006 assessment were excluded ($n = 284$), leaving 1867 participants for the subanalysis of newly reported mental health symptoms.

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The authors declare no conflict of interest.

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PTSD and Mental Health Symptoms

Study outcomes included symptoms of PTSD as well as mental health symptoms. Participants with newly reported PTSD or mental health symptoms were those who reported symptoms at the 2007–2008 assessment, but not at the 2004–2006 assessment, approximately 3 years earlier. Mental health symptoms consisted of an aggregate variable, which included either a mental health symptom (PTSD symptoms, depression symptoms, or panic or other anxiety symptoms) or an alcohol-related problem. PTSD symptoms were assessed through questionnaire response to the Posttraumatic Stress Disorder Checklist–Civilian Version, to allow for comparability with any population, particularly since participants are followed up longitudinally even after they leave the service. The sensitive criteria for PTSD symptoms was defined as moderate or higher level of at least one intrusion, three avoidance, and two hyperarousal symptom(s), as outlined in the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition*. Symptoms of depression, panic, or other anxiety disorder, as well as alcohol-related problems were assessed through response to the Primary Care Evaluation of Mental Disorders Patient Health Questionnaire.

IA Deployment

IA deployment status was determined using the Navy and Marine Corps Mobilization Processing System (NMCMPS), a centralized data source that began in 2003, which captures Navy personnel who have deployed as IAs. Deployment was assessed between the 2004–2006 and 2007–2008 surveys. Because historic records in this data source only captured the date that IA deployment orders were issued and not necessarily the actual deployment dates, these data were merged with deployment data from the Defense Manpower Data Center (DMDC). Members were classified as an IA deployer if they had an IA order begin date in the NMCMPS files prior to or during a deployment date specified by DMDC. If the IA order begin date was missing, the IA order generated date was utilized in which the order generated date had to be within 180 days prior to a DMDC-specified deployment date. Participants not meeting these criteria were classified as non-IA deployers. Data files included the different types of IAs: Global War on Terror Support Assignment (GSA) IAs for officers who received permanent change of station orders to move to a different unit and location after their IA deployment that also includes Overseas Contingency Operations Support Assignment IAs for enlisted, IA Manpower Management (IAMM) deployers who returned to their original home unit, and Mobilized Reserve (RC MOB) IAs who returned to their original home unit after activation.

Covariates

Demographics and military characteristics were obtained from the electronic personnel files maintained at DMDC and linked to each participant at the 2004–2006 assessment. Data included sex, birth year, education, marital status, race/ethnicity, service component, military pay grade, and occupation. Nonsmokers, past smokers, and current smokers were identified at the 2004–2006 assessment using survey questions addressing lifetime smoking of at least 100 cigarettes (5 packs), a successful attempt to quit smoking, and cigarette use in the past year. Prior assault was derived from the 2004–2006 assessment from a positive self-report of suffering forced sexual relations, sexual assault, or violent assault in the past 3 years.

Two combat exposure variables were created using the 2007–2008 assessment. First, for the 5-level combat exposure variable, participants were defined as having combat exposure on the basis of an affirmative self-report of personally witnessing or being exposed in the past 3 years to a person's death due to war or disaster, physical abuse, dead or decomposing bodies, maimed soldiers or civilians, or prisoners of war or refugees. Second, the 12-level combat exposure variable was assessed in a sensitivity analysis based on self-report since 2001 of experiencing the following during deployment: being attacked or ambushed, receiving small arms fire, clearing or searching homes or buildings, having experienced an improvised explosive device or booby trap explode near you, being wounded or injured, seeing dead bodies or human remains, handling or uncovering human remains, knowing someone or seeing Americans who were seriously injured or killed, having observed a member of your unit seriously injured or killed, or being directly responsible for the death of an enemy combatant or noncombatant.

Participants were considered to have a prior deployment in support of Iraq and Afghanistan, based on DMDC data if they deployed at least once from the start of the operations in 2001 until prior to their 2004–2006 assessment. Being bothered by having no support during a problem was assessed through one of the Patient Health Questionnaire items not previously assessed in this study. Participants were asked: "In the last 4 weeks, how much have you been bothered by any of the following problems? . . . Having no one to turn to when you have a problem."

Service satisfaction was evaluated at the 2007–2008 assessment in which participants were questioned on their overall feeling toward their military service. The five-item Likert scale responses were collapsed into the three categories of dissatisfaction (negative/somewhat negative), neither, and satisfaction (somewhat positive/positive). Self-reported separation from military service was captured for the first time during the 2007–2008 assessment. Participants were considered separated if they did not report that they were currently serving in the military (active duty, Reserve, or National Guard). Reasons for separation were determined at the 2007–2008 assessment where participants who separated from the military were asked if the following affected their decision to leave: dissatisfaction with deployments or frequent moves or both; military service created hardship for family; dissatisfaction with promotion, pay, or other benefits; dissatisfaction with job or leadership/supervision; desire to continue your education, start a new career, or change in personal goals; disability or other medical reasons; difficulty meeting weight standards and/or fitness standards; incompatibility with the military; legal problems or problems meeting a military obligation; or fulfilled term of service or was retirement eligible. A binary category was created in which "not at all" and "a little bit" were collapsed, whereas "moderately," "quite a bit," and "extremely" were grouped together. This allowed for the evaluation of moderate to extreme reasons for leaving the military compared with less than moderate reasons.

Statistical Analyses

Descriptive statistics and univariate analyses including chi-square tests of association were completed to investigate unadjusted associations between mental health symptoms and occupational and demographic risk factors. Multicollinearity was assessed through an initial model analysis using a variance inflation factor of four or more to indicate presence of multicollinearity. In addition, investigation of significant associations and possible confounding was undertaken while adjusting for all other variables in the model. Confounders were defined as changing the association between deployment and the mental health outcome by 10% or more, and were included in the final adjusted model. Separate models were created using multivariable logistic regression to evaluate the associations of IA deployment and newly reported PTSD symptoms, and the subanalysis of IA deployment and newly reported mental health symptoms. Additional descriptive statistics on satisfaction with military service, separation from service, and reasons for leaving the military, to include dissatisfaction with deployments, job, or leadership were explored. Data management and statistical analyses were performed using SAS software version 9.3 (SAS Institute, Inc, Cary, NC).

TABLE 1. Characteristics of Navy Individual Augmentees by Deployment Status

Characteristics[a] ($N = 2086$)	Non-IA Deployers[b] ($n = 1623$)		IA Deployers[b] ($n = 463$)	
	n	%[c]	*n*	%[c]
PTSD, sensitive criteria				
No	1567	96.5	438	94.6
New-onset	56	3.5	25	5.4
Sex				
Male	1241	76.5	352	76.0
Female	382	23.5	111	24.0
Birth year*				
Before 1970	622	38.3	285	61.6
1970 or later	1001	61.7	178	38.4
Education*				
High school or less	1129	69.6	243	52.5
Some college, Bachelor's or higher degree	494	30.4	220	47.5
Married				
Married	970	59.8	297	64.1
Not currently married	653	40.2	166	35.9
Race/ethnicity				
Non-Hispanic white	1145	70.5	342	73.9
Non-Hispanic black	183	11.3	46	9.9
Hispanic	150	9.2	48	10.4
Other	145	8.9	27	5.8
Service component*				
Active duty	1360	83.8	119	25.7
Reserve/National Guard	263	16.2	344	74.3
Military pay grade				
Enlisted	1211	74.6	326	70.4
Officer	412	25.4	137	29.6
Occupation*				
Combat specialist	338	20.8	82	17.7
Health care specialist	173	10.7	53	11.4
Prison guard	5	0.3	9	1.9
Other occupation	1107	68.2	319	68.9
Smoking status				
Nonsmoker	979	60.3	294	63.5
Past smoker	384	23.7	111	24.0
Current smoker	260	16.0	58	12.5
Prior assault				
No	1543	95.1	438	94.6
Yes	80	4.9	25	5.4
5-level combat exposure*				
No	1165	71.8	224	48.4
Yes	458	28.2	239	51.6
Prior deployment*				
No	955	58.8	353	76.2
Yes	668	41.2	110	23.8
Having no support during a problem				
Not bothered	1388	85.5	398	86.0
Bothered a little	189	11.6	53	11.4
Bothered a lot	46	2.8	12	2.6

HS, high school; IA, individual augmentee; PTSD, posttraumatic stress disorder.
[a]On the basis of 2004–2006 assessment unless otherwise indicated.
[b]Deployed in support of Iraq and Afghanistan between the 2004–2006 and 2007–2008 survey assessments.
[c]Numbers may not round to 100%.
[d]On the basis of the 2007–2008 assessment.
[e]Deployed in support of Iraq and Afghanistan between 2001 and prior to 2004–2006 survey assessment.
*$P < 0.05$.

TABLE 2. Adjusted Odds and 95% Confidence Intervals for Navy Individual Augmentees With Newly Reported Mental Health Symptoms Adjusted for Demographic, Military and Behavioral Characteristics, and Prior Assault

	PTSD		Mental Health‡	
Characteristics*	**AOR†**	**95% CI**	**AOR†**	**95% CI**
Deployment§				
Deployed, non-IA	1.00‖		1.00‖	
Deployed, IA	1.02	0.53–1.95	1.03	0.66–1.60
Sex				
Male	1.00‖		1.00‖	
Female	**1.86**	**1.11–3.13**	1.08	0.75–1.54
Birth year				
Before 1970	1.00‖		1.00‖	
1970 or later	0.96	0.57–1.61	**1.44**	**1.03–2.02**
Education				
High school or less	1.00‖		1.00‖	
Some college, Bachelor's or higher degree	0.69	0.34–1.40	0.78	0.49–1.26
Married				
Married	1.00‖		1.00‖	
Not currently married	1.08	0.66–1.78	1.37	0.99–1.89
Race/ethnicity				
Non-Hispanic white	1.00‖		1.00‖	
Non-Hispanic black	1.27	0.62–2.58	0.92	0.56–1.52
Hispanic	**2.13**	**1.14–3.99**	1.33	0.83–2.13
Other	1.76	0.83–3.70	1.05	0.61–1.79
Service component				
Active duty	1.00‖		1.00‖	
Reserve/National Guard	1.52	0.79–2.95	0.96	0.62–1.49
Military pay grade				
Officer	1.00‖		1.00‖	
Enlisted	**2.73**	**1.09–6.83**	1.67	0.96–2.90
Occupation				
Other occupation	1.00‖		1.00‖	
Combat specialist	1.40	0.78–2.50	1.07	0.72–1.60
Health care specialist	**0.40**	**0.17–0.94**	0.63	0.38–1.07
Prison guard	1.81	0.29–11.47	1.25	0.27–5.66
Smoking status				
Nonsmoker	1.00‖		1.00‖	
Past smoker	1.21	0.70–2.09	1.43	0.99–2.05
Current smoker	1.21	0.66–2.24	**2.02**	**1.37–2.98**
Prior assault				
No	1.00‖		1.00‖	
Yes	1.67	0.82–3.42	**1.98**	**1.14–3.45**
5-level combat exposure¶				
No	1.00‖		1.00‖	
Yes	**3.84**	**2.37–6.24**	**2.01**	**1.45–2.77**
Prior deployment#				
No	1.00‖		1.00‖	
Yes	1.13	0.70–1.82	0.99	0.73–1.36
Having no support during a problem				
Not bothered	1.00‖		1.00‖	
Bothered a little	**2.12**	**1.21–3.71**	**1.67**	**1.10–2.52**
Bothered a lot	**6.85**	**3.32–14.15**	**2.94**	**1.40–6.19**

AOR, adjusted odds ratio; CI, confidence interval; IA, individual augmentee; PTSD, posttraumatic stress disorder. Bold signifies statistically significant results.
*On the basis of 2004–2006 assessment unless otherwise indicated.
†Adjusted for all variables listed.
‡Newly reported mental health symptoms include: PTSD, depression, panic or other anxiety, and alcohol-related problem.
§Deployed in support of Iraq and Afghanistan between 2004–2006 and 2007–2008 survey assessment.
‖Indicates the reference category.
¶On the basis of the 2007–2008 assessment.
#Deployed in support of Iraq and Afghanistan between 2001 and prior to 2004–2006 survey assessment.

RESULTS

Among the 2086 Navy Millennium Cohort deployers with complete data, 463 (22.2%) were deployed as IAs in support of the operations in Iraq and Afghanistan, with 67.6% deployed as RC MOB IAs and 32.4% deployed as IAMMs. Of the 463 IA deployers, 25 (5.4%) newly reported PTSD symptoms approximately 3 years later (Table 1). After adjusting for covariates, IA deployment was not significantly associated with either newly reported PTSD symptoms (odds ratio [OR] = 1.02; 95% confidence interval [95% CI]: 0.53–1.95) or newly reported mental health symptoms (OR = 1.03; 95% CI: 0.66–1.60) (Table 2). In a sensitivity analysis, when participants who reported PTSD ($n = 23$) or mental health symptoms ($n = 151$) at the 2001–2003 assessment were further excluded, the measures of association did not change among IA deployers for either PTSD (OR = 1.12; 95% CI: 0.57–2.19) or mental health symptoms (OR = 1.14; 95% CI: 0.70–1.87).

Deployers who reported the 5-level combat exposure had an elevated odds of newly reported PTSD symptoms (OR = 3.84; 95% CI: 2.37–6.24), as well as newly reported mental health symptoms (OR = 2.01; 95% CI: 1.45–2.77). Similar results were found for the 12-level combat exposure variable (data not shown). Those who were bothered a lot by having no support during a problem were over six times more likely to newly report PTSD, and nearly three times more likely to newly report mental health symptoms.

Unadjusted descriptive analyses showed that overall satisfaction with the military was reported in approximately 80% of the participants, whereas less than 12% reported overall dissatisfaction. However, more IAs reported overall satisfaction with the military (82.0%) than non-IAs (78.2%) ($P \leq 0.05$). In addition, fewer participants with PTSD symptoms reported overall satisfaction with the military (46.9%) than those without PTSD symptoms (80.5%) ($P < 0.001$). Among the 231 (11.2%) participants who had separated by the 2001–2008 assessment, the most endorsed reasons affecting their decision to leave the military were fulfilled term of service or was retirement eligible, followed by dissatisfaction with job or leadership/supervision (Fig. 1). IAs (6.9%) were proportionately less likely to separate from service than non-IAs (12.4%) ($P \leq 0.05$). Leaving the service for education or career goals differed between IAs (28.1%) and non-IAs (58.8%) ($P < 0.001$). Items that differed by mental health status included less deployers with mental health symptoms separating to further educational or career pursuits ($P \leq 0.05$) and more separating because of medical reasons ($P \leq 0.05$).

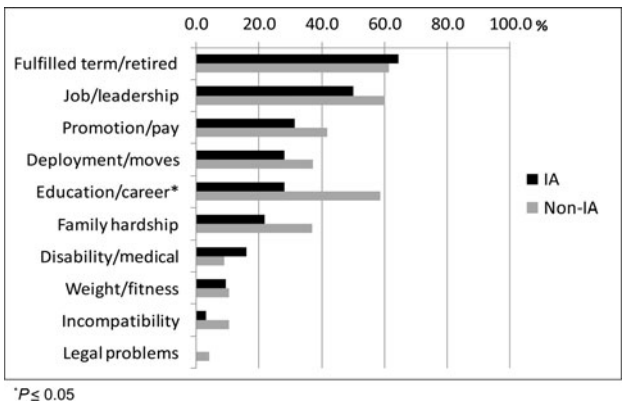

FIGURE 1. Percent frequency of moderate to extreme reasons for leaving military service among separated Navy deployers by individual augmentee (IA) status.

DISCUSSION

IA deployers, who presumably have lower social support or unit cohesion, were not at increased risk for PTSD or other mental health symptoms following deployment. Moreover, the proportion of deployers who newly reported PTSD symptoms may be considered low (5.4%). Changes in training that may have better prepared the IAs for the upcoming stressors, may have accounted for this statistically nonsignificant association. Changes in training included a greater amount of lead time between notification and deployment, increased training before and after deployment with more extensive land combat skills training, and increased support for IA deployers.[8,9] Previous studies have linked combat exposure[7,10,11] and low social support or unit cohesion[1–3,12,13] with mental health morbidity. In this study, reporting combat exposure or feeling bothered by having no support during a problem were positively associated with newly reported PTSD and other mental health symptoms. With greater communication technology available than in previous conflicts,[14] support from others outside of the deployed unit may have driven the association toward the null. These findings suggest that the current practice of individually augmenting a unit in support of the operations in Iraq and Afghanistan may not have deleterious effects on Navy IA deployers, but rather combat exposure and feeling bothered by having no support during a problem.

Descriptive analyses suggested that overall satisfaction and separation from service were not adversely affected by IA deployment. The RC MOB IAs, who comprised the majority of the IA deployers, were proportionately more likely to newly report PTSD (92.0%) than the IAMM deployers (66.2%) ($P < 0.001$). Further investigation of the RC MOB IAs and their unique deployment experiences are warranted. Considerable differences may exist from the nature of the IA assignment. GSA IAs, who have the added burden of moving to a different duty location after their IA deployment, may be isolated from the limited reunited support systems available upon return. GSA IAs were not represented in the current sample; however, they comprised less than 15% of IA deployers in the Navy. In contrast, IAs who served as prison guards in detainee operations, often several hundred members strong, may derive support from training, deploying, and returning together. In this study, none of the prison guards who served as IAs newly reported PTSD, though further investigation is needed in a larger sample.

This study has several limitations. Use of self-reported data may have resulted in reporting bias, yet survey-based identification of symptoms have been found to be reliable[15–17] and self-report may have better captured mental health conditions because less than 45% of service members referred for care do not have a documented mental health evaluation.[18] Nondifferential misclassification bias may have occurred because IA deployment end dates could not be accurately captured; however, the dates of IA deployment orders issued were linked to Contingency Tracking System–confirmed deployments to more accurately classify these deployments. Social support and unit cohesion were not directly captured, and were assessed through proxy measurements of IA deployment and being bothered by having no support during a problem. The modest sample size did not allow for stratified analysis of combat-exposed IAs and may have hindered the ability to detect a statistically significant difference in this study. In addition, these findings may not be generalizable as they are restricted to Navy deployers, though previous investigations on Millennium Cohort data suggest that these data are a reliable and representative sample of the US military.[6,19,20]

Despite these limitations, the comprehensive information available and the ability to link with multiple data sets allowed for a rich descriptive analysis of this understudied population. The ability to account for several potential confounding factors, otherwise unobtainable from existing electronic Department of Defense data sources, made it possible to examine adjusted associations.

Prospective analysis of US Navy IA deployers allowed for the investigation of risk for newly reported PTSD and mental health symptoms.

Although IA deployers, who presumably have lower social support or unit cohesion, were not at increased risk for mental health morbidity, deployers who reported combat exposure or feeling bothered by having no support during a problem were at increased risk for newly reported PTSD and mental health symptoms. This suggests that IA deployment itself may be less influential than shared stresses common among both IA and non-IA deployers. Further longitudinal follow-up of IA deployers, in-depth analysis of the different types of IAs, as well as the evaluation of over 6500 anonymous surveys that were administered to IAs during deployment from the US Navy's Behavioral Health Needs Assessment Survey, may provide further insight regarding the possible vulnerabilities of this population.

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14. ABSTRACT

Current deployments to Iraq and Afghanistan have generated concern regarding the association between combat deployment and mental health disorders. Those deploying on an individual assignment (IA) may be at increased risk for mental health challenges. The objective of this research is to describe new-onset of self-reported posttraumatic stress disorder (PTSD), depression, anxiety, and alcohol disorders in the Millennium Cohort and assess the relationship between IA deployment and mental health morbidity. Millennium Cohort Study members deployed for the first time in support of the wars in Iraq and Afghanistan between baseline and follow-up were included in these analyses (n = 12 952). Women deployed on an IA with reported combat exposures were at greatest risk of any mental health outcome (odds ratio [OR] 4.04; 95% confidence interval [CI], 1.90-8.62), PTSD (OR 8.24; 95% CI, 2.88-23.61), or alcohol abuse (OR 3.20; 95% CI, 1.11-9.25) postdeployment compared with regular deployed women without combat exposures. This investigation contributes insight into which additional services those deployed on an IA may benefit from to prevent mental health challenges. Military women deployed on IA, in particular, may benefit from additional time and efforts to increase social support and unit cohesion before deployment.

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